

# How well can poor child health and development be predicted with data collected in early childhood in the UK?

## Findings from the Millennium Cohort Study

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### Abstract

**Background** The recently introduced universal health check at 2·5 years old in England provides an opportunity to inform intervention strategies. Accurately identifying children with greater need of support remains a challenge. We explored how characteristics collected in early childhood can predict which children will have language and behavioural problems, and overweight–obesity in later childhood.

**Methods** We undertook predictive risk modelling using data on 15 637 children from the Millennium Cohort Study (MCS) collected at ages 9 months, 3 years, and 11 years. Outcomes were language disability ( $<-1\cdot25$  SD, British Ability Scale Verbal Similarities), socioemotional behavioural problems (score  $<16$ , Strengths and Difficulties Questionnaire), and overweight–obesity assessed at age 11 years. We compared the discriminatory capacity of two models using area under the receiver operating characteristic curve (AUROC). In one model data were collected at birth (sex, ethnicity, birthweight, gestational age, income, numbers of siblings, maternal age, education, employment, and smoking [ten items]). The other model was updated with further information collected at age 3 years in MCS, which cover domains also evaluated in the health check at 2·5 years old (language disabilities, socioemotional behavioural problems, overweight–obesity, child disability and illness, and hearing, speech, walking, and speaking concerns [an additional eight items, for a total of 18]).

**Findings** Model discrimination with demographic and perinatal data collected at birth was moderate for language (AUROC 0·720, 95% CI 0·706–0·734), poor for behavioural problems (0·691, 0·678–0·705), and fail for overweight–obesity (0·585, 0·575–0·595). Updating models with additional data on health status and parental concerns collected at 3 years old increased statistical discrimination for behaviour (0·767, 0·754–0·781; moderate) and overweight–obesity (0·692, 0·682–0·701; poor); for language it remained moderate (0·761, 0·747–0·774).

**Interpretation** Information at age 3 years from a nationally representative sample that covered domains of the health check at 2·5 years old in England modestly improves the ability to determine groups of children with higher risk of behavioural problems and of overweight–obesity in later childhood. Further research is needed to identify data and ages of collection that will improve prediction for policy and practice and to identify children more likely to benefit from early years support. A strength is the nationally representative sample; a limitation is the lack of an external validation sample.

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### Contributors

VS did the statistical analysis. VS wrote the abstract with input from CL, AP, BB, and DT-R. All authors have seen and approved the final version of the abstract for publication.

### Declaration of interests

We declare no competing interests.

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